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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/809,735	03/25/2004	Desmond R. Lim	58780(47686)	8185
21874	7590	01/18/2005	EXAMINER	
EDWARDS & ANGELL, LLP P.O. BOX 55874 BOSTON, MA 02205			SONG, SARAH U	
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DATE MAILED: 01/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/809,735	<b>Applicant(s)</b> LIM ET AL.	
	<b>Examiner</b> Sarah Song	<b>Art Unit</b> 2874	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

**A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.**

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 March 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____.  |

## **DETAILED ACTION**

### ***Drawings***

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: VOA 1706 (see Paragraph [0103], line 11). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Specification***

2. The disclosure is objected to because of the following informalities: In line 6 of Paragraph [0057], Examiner believes that "160" second occurrence should be changed to -151-; in line 11, Examiner believes that "2A" should be changed to -2B-. In line 1 of Paragraph [0103], Examiner believes that "22" should be changed to -24-; in line 9, Examiner believes that "1208" should be changed to -1708-.

Appropriate correction is required.

***Claim Objections***

3. Claim 5 is objected to because of the following informalities: in line 2 Examiner suggests changing “medium” to –element—in order to provide proper antecedent basis for the limitation. Appropriate correction is required.
4. Claim 6 is objected to because of the following informalities: in line 3 Examiner suggests deleting “of said” in order to provide consistency with the previous recitations for “said at least one high index contrast waveguide”. Appropriate correction is required.
5. Claim 9 is objected to because of the following informalities: in line 1, Examiner suggests deleting “an”; in line 3, “the at least one low index waveguide” lacks proper antecedent basis for the limitation. Examiner suggests changing the dependency of the claim from claim 7 to claim 8 in order to provide proper antecedent basis. Appropriate correction is required.
6. Claim 23 is objected to because of the following informalities: Applicant claims modulation of an input signal by cross gain modulation without the use of a continuous wave signal. However, in claim 22, from which claim 23 depends, Applicant claims the use of a continuous wave input, thus rendering claim 23 seemingly contradictory to claim 22. Appropriate correction is required.

***Claim Rejections - 35 USC § 102***

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. **Claims 1, 7-9 and 13-15 are rejected under 35 U.S.C. 102(e) as being anticipated by Kazarinov et al. (U.S. Patent 6,580,850).**

9. Regarding claim 1, Kazarinov et al. discloses an optical module comprising at least one gain element 1, an optical element 2 having at least one high index contrast waveguide 130 and at least one mode converter 144 optically connecting said at least one high index contrast waveguide to an external fiber 3, wherein said at least one mode converter and said at least one high index contrast waveguide are monolithically integrated with each other. See Figure 1a.

10. Regarding claims 7 and 8, Kazarinov et al. discloses that the at least one high index waveguide may be connected to at least one grating (Bragg reflector) to form an external cavity laser, wherein the grating is formed on the at least one low index contrast waveguide (single mode optical fiber). See column 8, lines 23-29.

11. Regarding claim 9, the module further comprises at least one second mode converter 142 being optically coupled between the least one low index contrast waveguide and at least one high index contrast waveguide.

12. Regarding claim 13, the at least one gain element of Kazarinov et al. consists of multiple gain regions, and a respective corresponding at least one mode converter MT4 being optically connected between a respective gain region and a respective corresponding at least one high index contrast waveguide. See Figure 7.

13. Regarding claim 14, each of said respective gain regions is locked to a respective different wavelength to form a WDM transmitter. See Figure 7.

14. Regarding claim 15, the optical module further comprises a multiplexer MZI optically coupled to each of said at least one high index contrast waveguide, wherein said multiplexer

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multiplies the respective different wavelengths (inherent), said multiplexer being monolithically integrated to said optical element. See Figure 7.

**15. Claims 1-6 are rejected under 35 U.S.C. 102(e) as being anticipated by Viens (U.S. Patent Application Publication 2003/0174956).**

16. Regarding claim 1, Viens discloses an optical module comprising an optical element having at least one high index contrast waveguide 12 and at least one mode converter 112-2 optically connecting said at least one high index contrast waveguide to an external fiber 10-2, wherein said at least one mode converter and said at least one high index contract waveguide are monolithically integrated with each other. See Figure 1. Viens also discloses that one of the fibers (e.g. fiber 10-1) in Figure 1 may be replaced by a gain element, such as a gain fiber. That is, Viens discloses that the optical element may also be used with a gain element. See Paragraph [0044].

17. Regarding claim 2, Viens also discloses a second mode converter 112-1, said second mode converter optically connecting said at least one high index contrast waveguide to the at least one gain element (the gain element in place of fiber 10-1); said second mode converter and said high index contrast waveguide 12 are monolithically integrated with each other.

18. Regarding claim 3, said second mode converter includes a tapered tip formed on said at least one high index contrast waveguide. See Figure 2.

19. Regarding claim 4, the tapered tip is one of adiabatic and linear. See Figure 2.

20. Regarding claim 5, said tapered tip is oriented toward each external face of the waveguide, and is thus oriented toward said gain element (said gain element in place of fiber 10-1).

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21. Regarding claim 6, it is noted that the at least one high index contrast waveguide 12 is optically connected to said at least one gain element (said gain element in place of fiber 10-1), and said at least one high index contrast waveguide is mode matched to said gain element via mode converter 112-1.

***Claim Rejections - 35 USC § 103***

22. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

23. **Claims 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kazarinov et al. in view of Jones (U.S. Patent Application Publication 2004/0136412).**

24. Regarding claims 10 and 11, Kazarinov et al. discloses at least one filter for wavelength selection (i.e. Bragg reflector, as noted previously) and to form an external cavity laser.

However, Kazarinov et al. does not expressly disclose said at least one filter being formed on said at least one high index contrast waveguide.

25. Jones discloses at least one filter 40 being formed on said at least one high index contrast waveguide, wherein the at least one filter includes at least one ring resonator 40.

26. Kazarinov et al. and Jones are analogous art as pertaining to external cavity lasers.

27. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the ring resonator filter 40 of Jones in the high index portion of Kazarinov et al.

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28. One of ordinary skill in the art would have been motivated to provide the ring resonator filter in order to provide for wavelength selectivity as taught by Jones et al. and to ease manufacture by enabling the filter to be made by the same process or in the same step as the waveguide itself.

29. Regarding claim 12, the ring resonator of Jones et al. is tunable to provide wavelength tuning of the external cavity laser. See Paragraph [0027].

30. **Claims 16 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kazarinov as applied to claim 1 above, and further in view of Welch et al. (U.S. Patent Application Publication 2004/0033004).**

31. Regarding claims 16 and 19, Kazarinov et al. discloses a filter (Bragg reflector, column 8, lines 23-29), but does not expressly disclose a filtered wavelength being a lasing wavelength of said at least one gain element to clamp a constant gain of said at least one gain element to produce a constant gain in an output signal of said optical module.

32. Welch et al. discloses an optical element comprising a filter optically coupled to a high index contrast waveguide, and a filtered wavelength of said filter being a lasing wavelength of said a gain element to clamp a constant gain of said at least one gain element to produce a constant gain in an output signal of said optical module. See Figure 7B.

33. Kazarinov et al. and Welch et al. are analogous art as pertaining to integrated optical waveguides.

34. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the filter of Kazarinov et al. to provide gain clamping in order



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to eliminate loss of gain to higher wavelength channels, as taught by Welch et al. See Paragraph [0109].

**35. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kazarinov et al. in view of Welch et al. as applied to claim 16 above, and further in view of Deacon (U.S. Patent 6,341,189).**

36. Regarding claim 17, Welch et al. discloses an amplifier (GC-SOA), but does not appear to disclose that the amplifier is biased well above a threshold so that a gain of the element is substantially at equilibrium with a loss through an external cavity formed by said filter and gain medium. However, Deacon discloses that laser operation is obtained when the gain element is biased above a threshold (column 9, lines 34-37). Therefore, it would have been obvious to one having ordinary skill in the art to bias the gain element of a GC-SOA above a threshold in order to provide the desired functionality of the device.

**37. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kazarinov in view of Welch et al. as applied to claim 16 above, and further in view of Jones.**

38. Regarding claim 18, a ring resonator is not expressly disclosed. Jones discloses at least one filter 40 being formed on said at least one high index contrast waveguide, wherein the at least one filter includes at least one ring resonator 40.

39. Kazarinov et al. and Jones are analogous art as pertaining to external cavity lasers.

40. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the ring resonator filter 40 of Jones in the high index portion of Kazarinov et al.

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41. One of ordinary skill in the art would have been motivated to provide the ring resonator filter in order to provide for wavelength selectivity as taught by Jones et al. and to ease manufacture by enabling the filter to be made by the same process or in the same step as the waveguide itself.

42. **Claims 20-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Karazinov et al. as applied to claim 1 above, and further in view of Liu (U.S. Patent 6,788,727).**

43. Regarding claim 20, Karazinov et al. does not expressly disclose a wavelength converter.

44. Liu discloses an integrated wavelength converter 101.

45. Karazinov et al. and Liu are analogous art as pertaining to gain elements.

46. Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to provide Karazinov et al. with a wavelength converter in order to provide versatility through increased wavelength capability, while also providing the improved coupling characteristics of the optical element of Karazinov et al. to an external fiber.

47. Regarding claims 21, the bias is not expressly disclosed. However, it is well known in the art to operate wavelength converters at at least a threshold. Therefore, it would have been obvious to one having ordinary skill in the art to provide the bias at at least a threshold in order to provide the basic functionality of the device.

48. Regarding claims 22 and 23, wavelength converters are well known in the art to modulate an input signal with a continuous wave input in order to produce a modulated wave output.

Wavelength converters based on XGM are also well known in the art. Therefore, the claimed limitations would have been obvious for basic operation of the device, since applicant has not

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disclosed that the particular wavelength converter solves any stated problem or is for any particular purpose and it appears that the invention would perform equally well with either type of wavelength converter.

### *Conclusion*

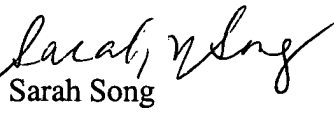
49. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sarah Song whose telephone number is 571-272-2359. The examiner can normally be reached on M-Th 7:30am - 6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney Bovernick can be reached on 571-272-2344. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Sarah Song  
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